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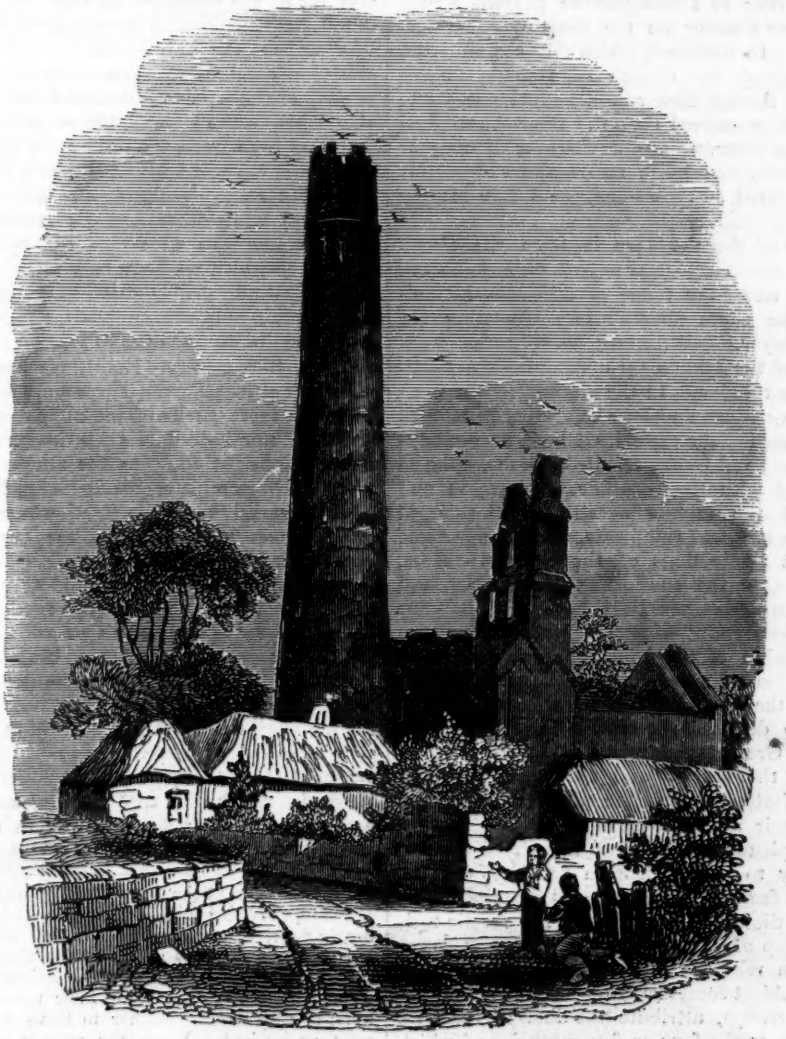
THE ROUND TOWERS OF IRELAND.



ROUND TOWER, KILDARE.

THE reader is probably aware of the existence in Ireland of a number of ancient buildings, which, from their form, have been called *Round Towers*. Their origin is altogether a matter of conjecture; and since nothing certain is known on the subject, numerous theories have been advanced, and keenly contested by and among antiquaries. Our object in the present article is to offer a few brief particulars, respecting these remarkable records of the ingenuity of a rude and uncivilized people.

Nothing in the history of masonry is more instructive than the duration of these Irish Round Towers. They will serve to illustrate an excellent practice adopted by Mr. Telford, which we shall presently notice; they also afford an early instance of the practice of erecting lofty buildings *from within*, thereby avoiding the expense of scaffolding, as has recently been practised, with decided economy, in constructing steam-engine chimneys.

The height of an Irish Round Tower sometimes exceeds 100 feet; their average height may be taken at ninety feet. Their outward circumference is about forty-five feet at the base, where the thickness of the wall is from three to four feet, lessening upwards in a due degree to the summit. The expense of such an edifice (if now built) would not exceed 300*l.* or 400*l.*

About 120 of these towers are known to have existed in Ireland, and ninety of them still remain in various stages of decay, with the exception of a few which are still perfect, to the very coping-stone of the roof. Some of these slender edifices have withstood the wind and the rain, and casual injury, during

1000 years; for, although the too-frequent exaggeration of Irish antiquaries and historians has created very general credulity, and, consequently, inattention to what is really true of the western island, and of its comparative civilization at an early date, it is highly probable that these towers were built in the course of the 500 years preceding the Norman conquest of England; that they were Christian edifices, and in reality the bell-towers of ancient churches, is proved by their constant connexion with ruined churches and ancient burial grounds in Ireland, and, indeed, the Tower of Donoughmore exhibits a rude sculpture of our Saviour on the cross over its doorway entrance. In Scotland, which received Christianity from Ireland, the church of Brechin affords example of a Round Tower annexed to the south transept, and now entered from it. Over the original entrance of this tower, which was closed with masonry when the church was built, and another door-way made, is sculptured, in rude relief, the Virgin Mother and her Babe.

The origin of these towers is from the Greek Church; and the Turkish disciples of Mohammed adopted them under the name of minarets, as convenient for the same purpose of summoning the faithful to prayer, substituting merely the well-trained voice of the Mollah for a small bell, not permitted by their religion. In the decline of the Constantinopolitan empire, and long before the Turcoman invaders approached the capital, civilized occupations fled before them, and Greek architects were employed to adorn Italy with the magnificent churches and bell-towers of the middle ages. St. Mark's at Venice, and its adjacent campanile, are perhaps some of the earliest productions of the Greek fugitives, who afterwards, in the confidence of their art, not only built Round Towers in Italy, but even built some of them purposely out of the perpendicular, thus striking the mind of the beholder with an incongruous sensation of the known fact, of their long duration, and the appearance of immediate downfall.

There is no difficulty in supposing, that some of the emigrant Greeks were attracted by the fame of Ireland, then the learned and the pious, to settle there, and imitate, in a suitable manner, the parish churches of their native land in the East. Egypt, the most conspicuous member of the Greek church, was not likely to be deficient in religious edifices, and the most famous of her sainted hermits is distinguished as Simon Stylites, from his ascetic residence on the top of a pillar,—in fact, a Round Tower connected with religious purposes. All things considered, in a subject confessedly obscure, the best conjecture will, perhaps, attribute the date of the Irish Round Towers, to the four or five centuries of which the reign of Charlemagne may be taken as the middle point.

The duration of these slender towers is worthy the attention, not only of the antiquary, but much more of the architect. The first element of superior durability, is seen in the large solid basement, or substructure, which was almost unavoidable from the position of the door-way at some distance from the ground; nor could the small diameter of the interior have admitted the entrance of timber spars for successive ladders, unless thrust upwards from a surface lower than the door-way. Among the ninety towers, which, in various states of decay, are still extant in Ireland, there are probably various specimens of the builder's art; the generality consist of that kind of careful masonry, called *Spauled Rubble*; in which small stones shaped by the hammer (in default of suitable stones at hand) are placed in every interstice of the larger stones; so that very little mortar is intermixed in the body of the wall, which is raised stage by stage of convenient height; the outside of spauled masonry especially presenting an almost uninterrupted surface of stone, supplementary splinters being carefully inserted in the joints of the undried wall.

The seemingly rude coverings of these towers are perhaps the best, that is, the most durable, ever devised by human wit. The arch familiar to the Greeks of the lower empire, could not be introduced where lateral abutment was impossible, and timber support was out of the question, so that the overlapping of flat stones consolidated by mortar into a hollow cone, was perhaps the only resource; and a few of these stone roofs still remain surmounted by their cap-stone. A civil engineer, connected with Mr. Telford's occasional missions to Ireland, has remarked, that the four windows (or narrow loop-holes), of these towers near the summit, accord with the four points of the compass; but some of the towers have only two such windows; while others have more than four.

We come now to notice the operations of Mr. Telford to which we before alluded.

This distinguished engineer had seen evidence of the weakness of masonry supports, which in appearance promised the utmost durability. The fall of St. Chad's Church, Shrewsbury (1788), disclosed to him the structure of its pillars. These were of great diameter, but were mere shells of masonry filled up with dry rubbish; nor indeed is such dangerous fallacy confined to ancient edifices: the rubble backing of the piers of Westminster Bridge (finished in the year 1745), scarcely supports itself whenever the surface of ashler-work is removed for occasional repairs. Mr. Telford led the way in preventing much of this kind of fraud in bridge-building, by substituting longitudinal walls under the road-way, instead of filling the space with earth or rubbish, a great improvement which has since been adopted by all engineers. And whenever masonry piers are of sufficient dimensions to admit of apertures large enough for the workman, and also admitting of an examination of his work, security is thus obtained, far more valuable than the questionable superiority of a solid mass, in which the true bearing and connexion of every stone as in a bonded wall, is not of necessity brought to a test.

I BREAKFASTED at the fort with Lieutenant Dalgetty, (says Holman, the blind traveller,)—part of which meal we were nearly deprived of by a crow that flew in at the window; but it was fortunately saved by the timely entrance of a servant. These birds are so audacious that all persons who desire to be secure from their marauding incursions must be very careful neither to leave doors nor windows open unwatched. When the natives are carrying home baskets of provisions on their heads, they are frequently attacked by a flock of these voracious birds, who pounce upon the contents; nor will they desist from the work of spoliation until the basket is set down, and they are literally driven from it by force of arms. The bold thieves plunder children still more mercilessly, actually snatching the food from their hands; and it is amusing to witness the art they use to dispossess a dog of a bone. No sooner has the animal laid himself down to enjoy his meal at leisure, than a predatory covey descend and hover over him. One more daring than the rest then alights beside him with the most unwelcome familiarity. The dog, startled and annoyed, suspends his labours, and growls out his displeasure, but in vain. The crow advances with the self-possession of an invited guest; until at last the exasperated owner of the prize lets fall his bone, shows his teeth, and makes an indignant snap at the pertinacious intruder, who dexterously eludes the bite which he has so cunningly provoked, while at the instant the dog's attention is diverted, another crow, who has been vigilantly watching the opportunity, seizes the coveted treasure, and bears it off in triumph.

SOME ADDITIONAL NOTICES ON THE SUBJECT OF GUNPOWDER.

THE following details respecting the nature and properties of Gunpowder, which, for want of space, were omitted in the last month's Supplement, will be found interesting.

There are some phenomena presented by the natural production of nitre, which we are unwilling to pass over without a slight notice, especially as they have been a source of much surprise and speculation: we mean the growth and accumulation of nitre on walls that contain much lime, either in the stone with which they are built, or in the mortar used as a cement to the stones. Perhaps we cannot better employ the short space which we can spare for this subject, than by giving a few details of experiments actually performed to elucidate the phenomena.

In 1814 Dr. Kidd, at that time Professor of Chemistry in the University of Oxford, read a paper before the Royal Society of London, on the accumulation of nitre on the walls of the laboratory of that university. He prefaced his remarks by a description of the building. The Ashmolean Museum of Oxford was built by Sir Christopher Wren, and is formed entirely of calcareous free-stone. The laboratory occupies the lowest story of the building,—its floor being nine feet below the level of the street. Three out of the four walls of the room are in contact with the external ground, but the fourth, or south side, is open to a court-yard or area. The walls are three feet thick, and on that side farthest from the court-yard, nitre is constantly effloresing from the substance of the stone. Its general consistency is that of very fine grains or crystals, which, taken collectively, have the appearance of down.

Dr. Kidd had frequently remarked its appearance, but in the winter of 1812 he began to notice it more regularly. He selected a particular spot, and brushed the whole of the efflorescence carefully away. In three days' time it again appeared; but gradually diminished for eight days, without any adequate external cause for its disappearance. This occurred at the end of January, and no new deposit appeared until the 16th of March, when an abundant supply effloresced in two days. Dr. Kidd remarked that the weather was frosty at the end of January, and at about the 16th of March, but milder between those periods—a circumstance worthy of notice. It was again removed, and again reformed by the 4th of April—the latter part of the time being cold. The surface of the wall was then thoroughly *scraped*, to give a new surface to the stone; but in thirteen days, the nitre formed on the new surface attained a maximum in quantity, and again diminished. A portion of the wall was wainscoted and then painted; but the nitre penetrated through both wood and paint, and appeared at the surface of the latter, which became loosened from the wood. On another spot a glass plate, about a foot square, was fixed parallel with the wall, at a distance of one-third of an inch from it, the edges being made air-tight by cement: the glass was then covered with a whitewash of prepared chalk and distilled water; but, although it was in the winter season, not a particle of nitre appeared on the outside for forty-one days that it was kept in that state. On removing the glass plate, the portion of wall behind it had a small quantity of nitre on it, but distinguished from any before seen by being in much larger crystals. The shortest time in which nitre formed after being brushed off, Dr. Kidd found to be four hours. The most general results appeared to be, that the formation was more rapid in winter than in summer, and that in summer light appeared to favour, but in winter to retard, the formation.

We may remark, that such of our readers as may have opportunities, would render service to science by making observations on these remarkable formations; Nitre is resolvable into oxygen, hydrogen, nitrogen, and potassium; and from what source the last substance can emanate is a matter of much speculation and theory.

A result which would be little expected by most persons, has been stated as having followed the pressure of a ramrod against the charge in a gun-barrel at the moment of firing. The account is translated into the Journal of the Royal Institution for 1831, from a foreign journal, and is in these words. "At the sitting of the Helvetic Society of Natural Sciences, of the 28th of July last, a letter was read from Dr. Flachin, of Yverdun, relating to an experiment before mentioned to the society, in which the ball was prevented from leaving the bottom of the musquet when the gunpowder was fired, simply by putting the ramrod upon the ball, and the end of the finger upon the ramrod. He supposes that the effect may be explained by the circumstance that near the charge the ball has a very small velocity compared to that impressed upon it by the expansive force of the gases from the fired gunpowder when exerted during the whole of the time in which it is passing along the barrel. It is well known that the effect thus accumulated is the reason why long pieces carry further than short ones, and why the breath of a man, which cannot exert a pressure of more than a quarter of an atmosphere, may, by means of a tube, throw a ball to the distance of sixty steps. The experiment above requires great care, especially as to the strength of the piece, which is very likely to be burst in the performance of the experiment."

In order to prove the necessity for the actual contact of flame, in order to explode gunpowder, the following experiment has been devised, and often performed by the writer. Take a narrow cork, about one inch in diameter, and round its circumference fold loosely several turns of lamp-cotton: place this in a little dish, somewhat larger than the diameter of the cork and cotton, and pour some spirit into the dish. Then place on the centre of the cork a conical heap of gunpowder—about a small thimble-full. Ignite the spirit in the dish, and the resulting flame will also be conical, entirely surrounding the cork and gunpowder; and the latter will be in no wise affected: it will remain for ten or fifteen minutes, provided there be sufficient spirit to burn during that time, and the powder will not be ignited; but if the flame be blown on one side, so as to bring it in contact with the powder, the latter will ignite almost immediately. Now the reason of this is to be found in the fact that flame is *hollow*: it has been appropriately called a luminous bubble filled with inflammable gas; but the gas can only inflame on the outside where it is in contact with the oxygen of the atmosphere, which is indispensable in all the ordinary instances of combustion.

There is also another experiment (familiar to the scientific lecturer) which shows the necessity of the presence of the air in order to explode gunpowder. A piece of iron is made red-hot, and placed on a metal stand upon the table of an air-pump. This is covered with a glass receiver, in the top of which is inserted a convenient apparatus for allowing gunpowder to fall down upon the incandescent iron. The air is exhausted, and the powder, falling upon the iron, is simply burned with a blue waving flame; but no detonation whatever results. The writer has often performed this experiment, and another equally striking:—A gun-lock, cocked and charged with powder, is placed under the receiver of an air-pump; the air is removed, and the gun-lock fired, but no action takes place on the powder. But when the air is re-admitted, and the gun-lock re-cocked and fired, the explosion of the powder takes place in the usual manner.

THE secret of rendering docile, and handling with impunity, the most venomous serpents, which has so long been in the possession of the natives of Western India, is not unknown in China. It is observed that the native snake-catchers here rub their hands, previous to taking hold of the snake, with an antidote, composed of pounded herbs. The virtue of the preparation is such that they hold with the naked hand, and provoke fearlessly, the deadly cobra di capello, or spectacle viper, which, next to the rattlesnake, is perhaps one of the most dangerous reptiles in existence. This serpent, in common with others of a similar nature, is not unfrequently met with in Canton, in the possession of those men, who, for a trifling gratuity, exhibit them to the curious spectator.—?

THE agility and strength of insects are well known. Ants can carry loads forty or fifty times heavier than themselves. Linnæus has calculated that the Melolontha is, relatively to its size, six times stronger than the horse; and he asserts if the proportional strength of the Lucanus, or stag-beetle, had been given to the elephant, it could have torn up the largest trees by the roots, and, like the giants of mythology, could have hurled huge rocks against its assailants.

RELIGION is that hope which is the resource and the comfort of the patient, and the sovereign balm for all the evils of life!—ANON.

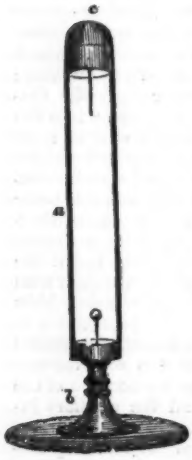
ELECTRICITY.

No. VII.

ELECTRICAL EXPERIMENTS.

ELECTRICITY moves with greater facility in rarefied air than in that of ordinary density, the spark diffusing itself and losing its characteristic brilliancy in proportion as the medium through which it is transmitted becomes more attenuated. This fact is strictly in accordance with our previous knowledge of the non-conducting properties of air, and would seem to imply, that, in a perfect vacuum, the motion of electricity must be the same as it is in good conductors.

Let *a* represent a strong glass tube, about eighteen inches long, and two inches in diameter, fitting air-tight at each end into brass caps, and supported by a stand *b*. The spherical portion of the cap *c* unscrews, and underneath it is an air-valve, opening outwards, to which can be attached a syringe, for the purpose of withdrawing air from the tube. A pointed wire at one end, and a brass ball at the other, project within the tube, to prevent the electricity from passing along its sides.



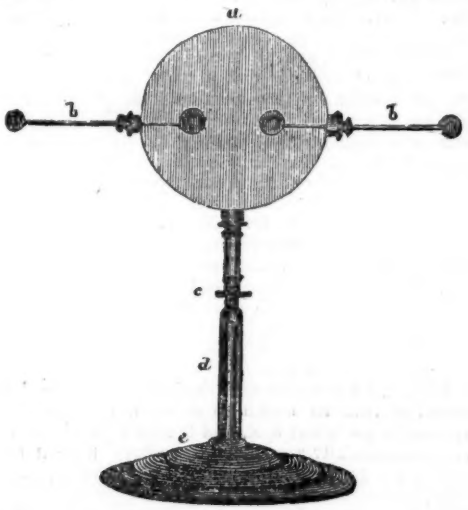
When the tube is in its ordinary state, if the cap *c* be placed near the conductor, and the machine set in motion, only a few feeble sparks will enter the tube, the remainder of the electricity making its escape externally.

Let the syringe be now fixed to the air-valve, and after working it, say ten or fifteen strokes, on presenting the tube to the conductor, in the same manner as before, the electricity will be seen to pass freely through it, and, by a little management on the part of the operator, it can be made to exhibit distinct and uninterrupted streams of violet-coloured light, which extend the whole length of the tube.

Again applying the syringe, and exhausting as much air as possible from the tube, if it be brought near the conductor, it will be found that a very small quantity of electricity will be sufficient to illuminate it; and in a darkened room it will appear to be filled with a lambent flame, the colours of which are changing every moment through all the varied hues of the rainbow.

Here is another form of apparatus for illustrating the effects of electricity, when transmitted through air or other gaseous bodies of variable densities:—*a* is a globular glass vessel, about nine inches in diameter, at opposite sides of which are brass rods, *b b*, sliding in air-tight collars, and terminating in balls of the same kind of metal. At *c* is a stop-cock, by which the globe is detached from its support *d e*, and connected with a syringe, or the plate of an air-pump, for the purpose of exhausting it of air: *d* is a glass pillar, and by its means the apparatus is insulated. In using it, therefore, it is necessary that one of the sliding rods should communicate with the floor by a wire or chain; the other being placed at any required striking distance from the conductor.

Proceeding as above directed with the luminous tube, we ought first to notice the effect of the electric spark in the globe when the latter is filled with air, and which will be precisely similar to that produced between two brass balls at the same distances, under ordinary circumstances. In proportion, however, as the air is withdrawn from the globe, it will be found that the space between the balls may be increased; and when the exhaustion is carried to its utmost possible limit, electricity of such feeble tension as scarcely to penetrate a column of air of half an inch in thickness, will pass with the utmost celerity entirely across the globe, filling its whole area with streams of light, the colours of which are so beautiful, their forms so various, and their movements so rapid, as fully to justify the general opinion, that this species of electric light is identical with that which constitutes the magnificent meteor called the Aurora Borealis.



It was noticed long ago, that the Aurora was, in some way or other, connected with magnetism. During the last few years it has been ascertained, that magnetism and electricity are so closely allied, that it is difficult, if not impossible, to assign to either its exact limits, or to determine, in any particular class of phenomena, where the one operates independently of the other

Returning for a moment to the exhausted globe, let us mention, that if it were possible to produce within it a perfect vacuum, that is, a space wholly void of air or vapour, we have reason to believe that electricity would pass through it without exhibiting any luminosity, something analogous to this having been observed in the nearest approach to a vacuum hitherto attained.

It is also deserving of remark, that in the experiments we have just been describing, whether a tube or a globular vessel be employed, the space through which the electric spark can be transmitted, its colour and the forms it assumes, depend solely on the density of the air. Hence we conclude, that the Aurora consists of diffused electricity passing from one part of the atmosphere to another, or, in some instances perhaps, from the earth to the atmosphere; the colours and other appearances presented by it being determined by distance, by the position of the observer, by the density, temperature, and hygrometrical state of the air, and most likely by other conditions which are only imperfectly understood.

The energy of the electric spark, next demands notice; and by that, we mean its power of communicating heat to certain substances, of igniting others, and, in an accumulated form, of dissolving metals and causing the disruption of the hardest minerals.

If a person stand on an electrical stool, (which is a stool with strong glass legs), and be in communication with the conductor, on exciting the machine,

the person thus situated will be charged with electricity; and if we present the knuckle, or a brass ball, to any part of his body, sparks will issue from it precisely in the same manner as they do from the conductor itself; but the colour of the sparks will not be so intensely white, as when taken from a metallic substance.

In this experiment the individual electrified is said to be *insulated*, the glass pillars which support him preventing the escape of electricity to the earth. This will be seen in a moment, if he touch any person or object not insulated; as in that case no sparks will be emitted from his body, the electricity passing off silently and unobserved to the floor.

The electrical stool must be wiped carefully before it is used; and we find it useful to place a large sheet of brown paper, thoroughly dried, underneath it, the more effectually to protect the legs from dust or moisture.

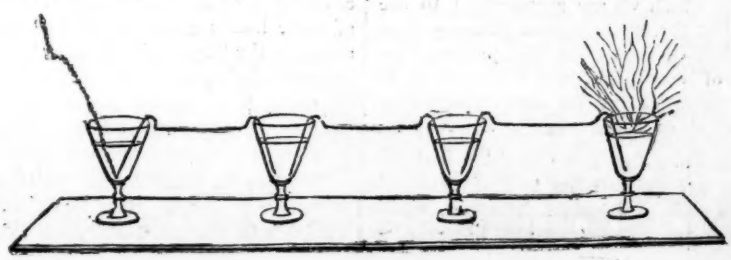
When a person is electrified in the manner just described, no painful, nor indeed, unpleasant sensations are experienced, excepting when another person or object approaches sufficiently near to receive the spark; that being accompanied by a sharp pricking at the surface of the body, and a vibratory, or rather convulsive motion of the muscles, varying in its intensity according to the length of the spark, the part from which it issues, and the nature of the materials of which the dress is composed. On these occasions the hair of the individual is more or less affected, the cause of which has been already explained*, and when it is long, dry, and of a fine texture, presents a very extraordinary appearance.

Let us now suppose a person to be standing on an electrical stool, as already mentioned. If another person take a table-spoon, the bowl of which, having been previously warmed, contains a small quantity of spirit of wine: on placing the surface of the spirit within about an inch of the top of one of the fingers (which must be pointed downwards) of the person on the stool, sparks will pass from the finger to the spoon, and in their transit will inflame the spirit. The same result will follow if the person electrified hold the spoon, whilst another receives the spark through the spirit on his knuckle, or by means of a brass ball.

This experiment can be pleasingly varied as follows:—Let four or more ale-glasses about three parts filled with cold water be placed, say, a foot distant from each other; a communication being made between them by separate wires, bent in the form as represented in the subjoined figure. The first glass must be connected with the machine by a chain, one end of which is attached to the conductor, and the other placed within the glass. On the surface of the water in the fourth glass, must be poured about a table-spoonful of ether. The machine being now set in motion, if a small brass ball be held just above the surface of the ether, sparks will pass through it from the water, and the ether will be instantly inflamed. In arranging the wires in the glasses, their points should not be in contact; as the electric energy will thereby appear the more remarkable; the ether being inflamed after the spark has passed through a column of water in each of the four glasses.

In this case, as in that also of spirit of wine, it is the vapour immediately above its surface which is first inflamed, and by that ignition is communicated to the liquid. Hence the necessity for warming the spoon containing spirit of wine, as that does not evaporate so rapidly as ether.

* See *Saturday Magazine*, Vol. XIII., p. 228.



STORMS OF SAND.

The great *Sahara Region* of Africa is a vast desert of sand, which is composed of particles of white and gray quartz, very small, and seldom attaining so large a size as to form gravel or pebbles. It is by far the dreariest region on the whole face of the globe, and the wind frequently raises this sand in clouds so dense as to overpower a whole company of travellers. "The sand-storm we had the misfortune to encounter," says Denham, "in crossing the desert, gave us a pretty correct idea of its dreadful effects. The wind raised the fine sand with which the extensive desert was covered, so as to fill the atmosphere, and render the immense space before us impenetrable but for a few. The sun and clouds were entirely obscured, and a suffocating and oppressive weight accompanied the flakes and masses of sand, which I had almost said we had to penetrate at every step. At times we almost lost sight of the camels, though only a few yards before us. The horses hung their tongues out of their mouths and refused to face the clouds of sand. A parching thirst oppressed us, which nothing alleviated."

When whirlwinds visit this immense desert, the sand is raised into pillars, a vivid description of which has been left us by the traveller Bruce. "At one o'clock," says he, "we alighted among some acacia trees at Wady el Halboub, having gone twenty-one miles. We were here at once surprised and terrified by a sight surely one of the most magnificent in the world. In the vast expanse of desert from west to north-west of us, we saw a number of prodigious pillars of sand at different distances, at times moving with great velocity, at others stalking on with majestic slowness. At intervals we thought they were coming in a very few minutes to overwhelm us, and small quantities of sand actually more than once reached us; again they would retreat, so as to be almost out of sight, their tops reaching to the very clouds; then the tops often separated from the bodies, and these, once disjoined, dispersed in the air, and did not meet more; sometimes they were broken in the middle as if they were struck with a large cannon shot. At noon they advanced with considerable swiftness upon us, the wind being very strong north. Eleven ranged along side of us, at about the distance of three miles; the greatest diameter of the larger appeared to me, at that distance, as if it would measure ten feet: they retired from us with a wind at south-east, leaving an impression on my mind to which I can give no name, though surely one ingredient was fear, with a considerable degree of wonder and astonishment. It was vain to think of flying: the swiftest horse would be of no use to carry us out of this danger, and the full conviction of this riveted me to the spot."

Adanson, in crossing the river Gambia from the Great Desert, observed one of these pillars of sand crossing that river. It passed within eighteen or twenty fathoms of the stern of the vessel, and seemed to measure ten or twelve feet in circumference, and about two hundred and fifty feet in height. Its heat was sensibly felt at the distance of a hundred feet, and it left a strong sulphureous smell behind it.—?

WRITING MATERIALS.

No X. On Wafers.

Respecting the antiquity of wafers Mr. Spiess of Halle has remarked that the oldest seal with a red wafer appears to be on a letter written by Dr. Krapf of Spiess, in the year 1624, to the government of Bayreuth. Spiess also discovered that some few years after the last-mentioned date, the Brandenburg factor at Nuremburg, whose name was Forstenhausser, sent wafers, similar to the one just alluded to, to a bailiff at Osternohe. It appears, however, that wafers were not used, during the whole of the seventeenth century, in the chancery of Brandenberg, but only by private individuals, and even by these to a very limited extent; the reason being, as was observed by Spiess, that writers preferred the (so called) Spanish wax to wafers. The first wafers with which the chancery of Bayreuth began to seal their documents, were, according to the details of an expense-book of the year 1705, sent from Nuremburg. The employment of wax, however, still continued, and in the archives of Plassenburg there is a rescript, written in the year 1722, and sealed with the proper sealing-wax. The exclusive use of wax must have continued to a still later period in the duchy of Weimar; for in the *Electra juris publici* there is an order of the year 1716, by which the introduction of wafers in law matters was forbidden, and the use of wax enforced. This order was abolished by order of Duke Ernest Augustus, in 1741, and wafers were again introduced.

The invention of wafers is attributed to the Genoese. The date of the introduction of wafers into England does not appear.

The adhesive property of common paste belongs to *gluten*, one of the ingredients of most of the esculent seeds, especially wheat. In the manufacture of wafers, fine wheaten flour is employed: this is formed into a smooth paste, with two other adhesive ingredients, viz. white of egg and isinglass. This paste is spread evenly over six plates, with a certain pressure, and dried in an oven, or at a peculiarly shaped stove. Several of these tin plates are piled upon each other, and the contact of the heated metal with the sheet of paste communicates to it a smooth glossy surface. When the drying is complete, the sheets of paste are placed upon each other to the thickness of an inch or so, and then cut into wafers of various sizes by means of hollow punches. The wafers being allowed to pass up the hollow cavity, they merge at an opening which is formed for that purpose at the side of each punch. The various colours which we are accustomed to meet with in wafers are communicated to them by the usual colouring materials, such as red-lead, vermilion, smalt, &c., which are mixed up with the paste, previous to the process of drying. Some of these colours being poisonous, the wafer-maker sells the refuse coloured clippings for the purpose of destroying rats and other vermin.

A very elegant form of wafers, called *medallion wafers*, was invented some years ago. The surface of each wafer represents in relief many of those classical and antique devices which we are accustomed to see in ordinary seals, but the effect is more pleasing than in the latter. Medallion wafers are thus prepared:—A given quantity of very pure glue is dissolved in water, to which a coloured tint has been imparted by turmeric, brazil-wood, or some other dye. A gem, seal, or medallion, is then moistened with a weak solution of gum, in which an opaque, white, or other material has been dissolved: this coloured gum-water is then carefully wiped off the plane projecting parts of the seal, and allowed to remain only in the hollows or other depressions. A small quantity of the coloured glue, in a melted state, is poured over the seal, and the whole is dried by a gentle heat. In drying, the glue and gum shrink, and thus become easily separable from the seal. Matters are so arranged that the medallion wafer shall present a thickness not exceeding that of common writing-paper, and it then yields a beautiful copy of the seal; the coloured gum giving the device, and the glue the ground; and when the respective colours are well chosen, the whole appearance of the wafer is chaste and harmonious. It will readily be supposed that so elegant a wafer is not intended to be hidden by being placed between the folds of a letter: it is, on the contrary, used much in the same way as a common seal of sealing-wax, so far as its position is concerned. The part of the paper to which it is to be applied is wetted slightly, and the back surface of the wafer is placed on the wetted part, to which it immediately adheres, in consequence of the glutinous nature of its ingredients. The process of forming these wafers amounts, in fact, to forming a mould of any seal, intaglio, &c., and with certain variations, this process has long been in use for taking impressions from ancient coins, &c. The application of the process to the making of wafers is, however, the novelty of the invention.

There is a kind of wafer, called *French isinglass wafer*, prepared in the following manner. Isinglass is dissolved in water to a proper consistence, and is poured upon glass plates with raised borders; these plates have previously been rubbed over with ox-gall, to prevent the adhesion of the isinglass. Various colouring materials, and frequently perfumes of various kinds, are mixed with the isinglass in a fluid state, and before the film on the plate is quite dry, it is cut along the edges, and separated from the plate. It is then cut into wafers in the usual manner. These wafers are exceedingly thin, and are far more adhesive than the common wafers: they also require less wetting to make them adhere. These wafers were sold some years ago in London, in the neighbourhood of Wood-street, Cheapside, at a wafer-maker's. They were called "Patent Wafers," and were sold in sixpenny packets, each containing 150 or 200 wafers.

DANCE OF THE DERVISHES.

In a mosque at Tophana was exhibited the Dance of the Dervishes; a ceremony so extraordinary, that it is necessary to see it, in order to believe that it is really practised by human beings, as an act of devotion.

As we entered the mosque, we observed twelve or fourteen Dervishes walking slowly round, before a superior, in a small space surrounded with rails, beneath the dome of the building. Several spectators were stationed on the outside of the railing; and being, as usual, ordered to take off our shoes, we joined the party. In a gallery over the entrance were stationed two or three performers on the tambourine and Turkish pipes. Presently the Dervishes, crossing their arms over their breasts, and with each of their hands grasping their shoulders, began obeisance to the Superior, who stood with his back against the wall, facing the door of the mosque. Then each in succession, as he passed the Superior, having finished his bow, began to turn round, first slowly, but afterwards with such velocity that his long garments, flying out in the rotary motion, the whole party appeared spinning like so many umbrellas upon their handles. As they began, their hands were disengaged

from their shoulders, and raised gradually above their heads. At length, as the velocity of the whirl increased, they were all seen, with their arms extended horizontally, and their eyes closed, turning with inconceivable rapidity. The music, accompanied by voices, served to animate them; while a steady old fellow, in a green pelisse, continued to walk among them, with a fixed countenance, and expressing as much care and watchfulness as if his life would expire with the slightest failure in the ceremony.

I noticed a method they all observed in the exhibition; it was that of turning one of their feet, with the toes as much inward as possible, at every whirl of the body, while the other foot kept its natural position. The elder of these Dervishes appeared to me to perform the task with so little labour or exertion, that, although their bodies were in violent agitation, their countenances resembled those of persons in an easy sleep. The younger part of the dancers moved with no less velocity than the others; but it seemed in them a less mechanical operation. This extraordinary exercise continued for the space of fifteen minutes; a length of time, it might be supposed, sufficient to exhaust life itself during such an exertion; and our eyes began to ache with the sight of so many objects all turning one way.

Suddenly, on a signal given by the directors of the dance, unobserved by the spectators, the Dervishes all stopped at the same instant, like the wheels of a machine; and what is more extraordinary, all in one circle, with their faces invariably towards the centre, crossing their arms on their breasts, and grasping their shoulders as before, bowing together with the utmost regularity, at the same instant, almost to the ground. We regarded them with astonishment, not one of them being in the slightest degree out of breath, heated, or having his countenance at all changed. After this they began to walk, as at first; each following the other within the railing, and passing the Superior as before. As soon as their obeisance had been made, they began to turn again. This exhibition lasted as long as the first, and was similarly concluded. They then began to turn for the third time; and as the dance lengthened, the music grew louder and more animating. Perspiration became evident on the features of the Dervishes; the extended garments of some among them began to droop, and little accidents occurred, such as their striking against each other: they nevertheless persevered, until large drops of sweat falling from their bodies upon the floor, such a degree of friction was thereby occasioned, that the noise of their feet rubbing the floor was heard by the spectators. Upon this, the third and last signal was made for them to halt, and the dance ended.

This extraordinary performance is considered miraculous by the Turks. By their law, every species of dancing is prohibited; and yet, in such veneration is this ceremony held, that an attempt to abolish it would excite insurrection among the people.——Dr. E. D. Clarke.

HIMYARITIC LANGUAGE.

Many of our readers will be interested with some extracts from a letter, written by Lieut. Wellsted, of the Indian Navy, and recently read before the Asiatic Society. It is on a subject of much interest, not merely to the philologist and historian, but also to those who are, by such researches, placed in a position to defend the Inspired Volume from the sneers and attacks of infidels, and to confirm the important fact, that the more thoroughly these regions are investigated, the more scrupulously correct will be found the Sacred writings. But let us hear Mr. Wellsted.

At the period of the promulgation of the Koran, two alphabets were used in Arabia—the Kufic, in which that work is written, and which we are still able to decipher, and the Himyaritic, adopted by the people of Yemen, but which, until I found it, was supposed to be lost to us. I know not, therefore, on what grounds certain philologists have conjectured it bore a strong affinity to the Ethiopic: but, when the Koran appeared in the Kufic character, the inhabitants of Yemen were unable to read it. It has frequently been a subject of regret that we were in possession of no inscriptions from the country * by which these points might be determined. Niebuhr, during his stay in Arabia, sought in vain for them. I add, that, "owing to the locality in which these inscriptions are found, and for other reasons I venture to suggest that these, together with those found at Hassan Gorab, are in the lost Himyaritic writing. Should this prove the case, the resemblance to the Ethiopic is not conjectural, since a complete identity in many of the letters can be traced."

On this subject the Geographical Society, in a review of the Ethnography of the African races, observes—"Dr. Pritchard brings arguments to prove that the Abyssinian alphabet was derived from the Himyarites, and not invented by the first Christian missionaries at Axum, as Michaelis and other biblical writers have supposed; and here we may observe, that it has been discovered by Lieutenant Wellsted that such was precisely the fact. The letters of the Abyssynians, or characters nearly resembling them, have been used of old by the Himyarites; and this discovery, anticipated from a survey of historic probabilities made by a British naval officer, has put an end to a controversy, long agitated amongst the European literati, as to the era and manner in which the Abyssinians came to be possessed of the art of writing."

Mr. Wellsted then proceeds to draw the attention of the Society to the important fact, that there is the strongest reason for believing this Himyaritic language to be still a spoken one; he gives, indeed, a few words of the language which he brought with him; and, to place the matter beyond doubt, recommends that a copious vocabulary be forthwith obtained from Arabia.

For reasons, into which he enters at some length, Lieut. Wellsted states his opinion, that a most powerful monarchy once existed in Yemen, South Arabia, which extended its limits to India, endured 2000 years, and numbered amidst its monarchs the renowned Queen of Sheba. One of these monarchs extended his conquests into Chinese Tartary; and much as the reality of this expedition has been doubted, Mr. Wellsted brings to our notice, that when the early Mohammedan conquerors took Bokhara, they found over one of its gates an inscription, in the Himyaritic character, expressly recording the visit of this monarch.

There can be little doubt, but that this character and language is one of the oldest (if not the oldest) on the face of the globe. "Writing was known to Job and to the Himyarites many centuries before Mohammed, as appears from some ancient monuments said to remain in that character."—*Universal History*. One of these "ancient monuments," therefore, it has been my good fortune to discover. Again, the same authority says, "The Himyarites were not strangers to the art of writing, the characters used by them were the most ancient of any used by the Arabs; from the mutual dependence of the letters or parts upon each other it was called *El Mosnad*." At this point, however, we have enough to pronounce, that a new Semetic language is probably before us, which may, in ancient times, have extended over Asia, and which by future researches promises to add a new version of the Bible to the

* Sir William Jones, in his annual address, more than once alludes to this desideratum; and, in a Memoir addressed by the French academicans to the King of Denmark, seventy-five years ago, it formed one of Michaelis's questions for the solution of the celebrated Danish travellers, who were about to proceed to Yemen. Michaelis appears to have been fully aware of the importance of obtaining this character and language.

collection of our Polyglott. I do not hesitate even to predict, that we have enough before us, to call seriously in question the correctness of a portion of our present system of comparative geography.

Lieut. Wellsted proceeds to pronounce his decided belief, that Yemen was the country from whence came the Queen of Sheba, to honour, in the plenitude of his wisdom and his power, the wise sovereign of Israel. He has ascertained that the country does now, and has ever since, retained that name. He throws also some curious lights on the Scriptural narrative, as to the voyage of the latter monarch, and the fleets to Tarshish and Ophir, concerning which the learned have been much divided. Lieut. Wellsted also brings to our notice a most singular and most interesting fact, that inscriptions in this ancient character have, since his discovery of those in Arabia, been found in Asia, in Africa, and even in America. But we must close our notice of this letter with Lieut. Wellsted's concluding remarks.

I have only to add, that whither the clue we have thus obtained to the decyphering of these inscriptions will lead, is a point on which I will not permit myself now to speculate; but, if we succeed, it is impossible to conceal, that we have in prospect the certainty of deciding on the existence of a mighty empire:—one of the oldest languages in the world will be presented in an open volume to us; a light will be thrown on all that space which has hitherto been wrapped in the gloom of ages. The era of letters, the migration of nations, the progress of civilization, the desolating march of eastern conquerors may be traced—while the traditions and writings of the Arabian and profane authors will not, in this and in other cases, be deemed so wholly unworthy of credence; and, at the same time, we may look forward with confidence to receiving further testimonials to the scrupulous fidelity of the sacred writings.

THE STRUCTURE OF THE BLOOD AND MUSCULAR FIBRES.

WE have already noticed, in several volumes of this Magazine, the wonderful discoveries which are due to the invention of the microscope; but the wonders it has developed are almost innumerable, all tending to exhibit in various aspects, the continued beneficence of the Creator, for the comfort and well-being of his creatures. The blood, muscles, and nerves, have been subjected to examination, and the beauty of their structure has been found to be surpassingly great. The microscope teaches us that blood is composed of a number of red globules floating in a colourless liquid; these red globules are so minute that the space of a superficial square inch will contain by calculation as many as 2,890,000; but when deprived of their colouring matter, which appears not to be contained in their substance, but merely to cover their surface, the same space will hold as many as 4,000,000.

Fig. 1. Fig. 2.

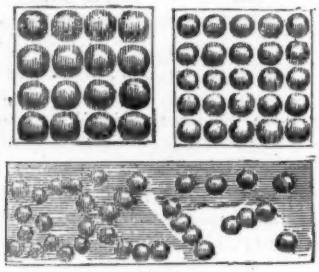


Fig. 3.

Fig. 1 shows a small square spot containing sixteen coloured globules of blood. A spot of the same size, fig. 2, will contain as many as twenty-five globules when deprived of their colouring matter

In order to obtain a good view of the globules in their coloured state, it is necessary that a very small quantity of blood only, should be smeared as thin as possible on the glass, that all moisture may instantly evaporate; they then remain of their full size and colour, perfectly spherical, as in fig. 1. If a greater quantity of blood, be laid upon a glass which retains moisture, only for the space of half a minute, the colouring matter begins, in a few seconds, to separate, and form a circle round the globule, and if the blood is diluted with water, the separation of the colouring matter is instantaneous, and the globule puts on the appearance represented in fig. 2. When the globules in the human blood lose the colouring matter, they continue floating, till they gradually appear to be attracted by each other, or to collect in groups, as in fig. 3; from this arrangement, Sir Everard Home thinks it probable that the globules are that portion of the blood from which the fibres of the muscles are formed.

Fig. 4.

He made several attempts to ascertain the construction of the muscular fibre, and at last succeeded in laying a single fibre from the thigh of a roasted chicken under the microscope. It was then found, that if the muscular fibre of a chicken, which has been boiled or roasted, be soaked in water, changing the water every day for a week, single fibres can be easily detached, and they appear as in fig. 4; and if they are still kept in water, they are broken down into numerous small globules, of the same size as those found in the blood.

In pursuing his inquiries, as to the properties of the blood, another singular phenomenon came under his notice; he observed, that if a quantity of this fluid was allowed to remain at rest for a short time, a thin film, or pellicle, was soon formed on its surface; a quantity of air was also disengaged from its substance, which, being unable to force its way through the film, formed channels under its surface, running in various directions, and having the exact appearance of empty blood-vessels. Observations of a like nature were then made on the blood, which, having flowed from a wound, had coagulated on its surface on the living body; here the same channels were made by the disengagement of air, but, instead of remaining empty, as in the first experiment, they became filled with liquid blood from the smaller veins and arteries, and becoming connected with them, formed fresh living tissue, and thus connected the parts divided by the wound.

RAMLA, an ancient town of Palestine, now in ruins, says Mr. Thompson, a missionary, who was there in May, 1834, has, at no very remote period, been much larger than at present. The number of inhabitants is perhaps six thousand, mostly Mussulmen and Greek Christians; but what is extraordinary is the fact that at least one half the population is blind, either in one or both eyes, and many of the inhabitants have such weak eyes that they keep them half closed. Ramla is situated in the centre of a vast plain in the valley of Sharon; and it is probable that the continual reflection of the sun's rays from the white sand is the cause of this universal calamity.

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